

PART 1 - GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred within the text by the basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI 283.3 (1971; Addenda 1972 and 1976, R 1989) Gas Utilization Equipment in Large Boilers

AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

ASME CSD-1 (1995) Controls and Safety Devices for Automatically Fired Boilers

ASME BPVC SEC IV (1995; Addenda 1995 and 1996) Boiler and Pressure Vessel Code: Section IV Heating Boilers

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 53 (1996) Pipe, Steel, Black and Hot-Dipped Zinc-Coated Welded and Seamless

ASTM C 592 (1980) Mineral Fiber Blanket Insulation and Blanket-Type Pipe Insulation (Metal-Mesh Covered) (Industrial Type)

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 85C (1991) Prevention of Furnace Explosions in Fuel Oil- and Natural Gas-Fired Single Burner Boiler-Furnaces

NFPA 211 (1996) Chimneys, Fireplaces, Vents, and Solid Fuel Burning Appliances

UNDERWRITERS LABORATORIES INC. (UL)

UL 795 (1994; R 1996) Commercial-Industrial Gas Heating Equipment

1.2 DEFINITION

a. Year 2000 compliant - means computer controlled facility components that accurately process date and time data (including, but not limited to, calculating, comparing, and sequencing) from, into, and between the twentieth and twenty-first centuries, and the years 1999 and 2000 and leap year calculations.

1.3 RELATED REQUIREMENTS

Section 15050, "Basic Mechanical Materials and Methods," applies to this section, with the additions and modifications specified herein.

1.4 DESIGN REQUIREMENTS

Boiler shall be high efficiency condensing boiler with 15:1 turn down ratio or multiple pulse boilers with control system to sequence boilers to match load. Boiler to be designed to supply low water temperature to the loads to provide efficient distribution system and to allow control valves to modulate and maintain adequate coil flow for efficient heat transfer. Boilers to be arranged in the space to allow ease of maintenance and access to all components requiring maintenance. Boiler shall have a minimum output of 1280 MBH at site Altitude and with a non condensing full load average operating efficiency of 92%. Boiler shall be designed, tested, and installed in accordance with ASME BPVC SEC IV and ASME CSD-1. Paint boiler in accordance with manufacturer's standard requirements. Boiler design working pressure shall be 125 psig. Boiler operating pressure shall be 30psig. Boiler operating temperature shall be 140 degrees F, Boiler return water temperature shall be 110 degrees F.

1.4.1 Detail Drawings:

Submit fuel trains schematic and wiring diagrams.

1.4.2 Water Analysis:

Provide test reports of water analysis.

1.4.3 Safety Standards:

Hot water boilers, burners, and any supplementary control devices, safety interlocks, or limit controls required under this specification shall meet requirements of the following standards as applicable:

- a. Gas-Fired Units: UL 795, NFPA 85C, or ANSI 283.3.
- b. All Units: ASME BPVC SEC IV and ASME CSD-1.

Controls not covered by the above shall have a UL label, UL listing mark, or shall be listed in the Factory Mutual Approval Guide.

1.5 SUBMITTALS

Submit the following in accordance with Section 01330, "Submittal Procedures."

1.5.1 SD-02, Shop Drawings

- a. Fuel trains
- b. Wiring diagrams

1.5.2 SD-03, Product Data

- a. Boilers: power output, efficiency, ASME certification, allowable working pressure, model number
- b. Boiler trim and control equipment
- c. Burners and control equipment
- d. Stack, breeching, and supports

1.5.3 SD-06, Test Reports

- a. Operational tests

1.5.4 SD-07, Certificates

- a. Boilers
- b. Burners and control equipment
- c. Boiler trim and control equipment
- d. Year 2000 (Y2K) Compliance Warranty
- e. Water analysis

Boiler manufacturer's certificate of boiler performance including evidence that the burners provided shall be a make, model, and type certified and approved by the manufacturer of the boiler being provided.

1.5.5 SD-08, Manufacturer's Instructions

- a. Boilers: Feed water treatment system

1.5.6 SD-10, Operation and Maintenance Data

- a. Boilers, Data Package 4

Submit operation and maintenance data in accordance with Section 01781, "Operation and Maintenance Data."

1.5.7 SD-11, Closeout Submittals

- a. Posted operating instructions for heating water boilers

1.6 WARRANTY

1.6.1 Year 2000 (Y2K) Compliance Warranty

For each product, component and system specified in this section as a "computer controlled facility component" provide a statement of Y2K compliance warranty for the specific equipment. The contractor warrants that each hardware, software, and firmware product delivered under this contract and listed

below shall be able to accurately process date and time data (including, but not limited to, calculating, comparing, and sequencing) from, into, and between the twentieth and twenty-first centuries, and the years 1999 and 2000 and leap year calculations to the extent that other computer controlled components, used in combination with the computer controlled component being acquired, properly exchange data and time data with it. If the contract requires that specific listed products must perform as a system in accordance with the foregoing warranty, then that warranty shall apply to those listed products as a system. The duration of this warranty and the remedies available to the Government for breach of this warranty shall be defined in, and subject to, the terms and limitations of the contractor's standard commercial warranty or warranties contained in this contract, provided that, notwithstanding any provisions to the contrary, in such commercial warranty or warranties, the remedies available to the Government under this warranty shall include repair or replacement of any listed product whose non-compliance is discovered and made known to the contractor in writing within one year (365 days) after acceptance. Nothing in this warranty shall be construed to limit any rights or remedies the Government may otherwise have under this contract, with respect to defects other than Year 2000 performance.

PART 2 - PRODUCTS

2.1 Y2K COMPLIANT PRODUCTS

Provide computer controlled facility components, specified in this section, that are Year 2000 compliant (Y2K). Computer controlled facility components refers to software driven technology and embedded microchip technology. This includes, but is not limited to, telecommunications switches, programmable thermostats, HVAC controllers, utility monitoring and control systems, alarms, security systems, and other facilities control systems utilizing microcomputer, minicomputer, or programmable logic controllers.

2.2 BOILERS

Shall conform to the applicable requirements of ASME VIII. Hot-water boilers shall be Up flow down flow or pulse combustion type to meet specified efficiency and control turn down ratio. Provide each boiler complete burner and fuel system, a forced or induced draft fan, an automatic electronic control system complete with combustion and flame safeguard controls, firing sequence programmer, safety interlocks, limit controls and central control panel, and such trim and appurtenances as are peculiar to water units as specified herein. Units shall be factory-wired and assembled except for such readily installed appurtenances as safety valves, water columns, and pressure gages. Units shall be complete and ready for operation when connected to water, fuel, and electrical supplies.

2.3 BURNERS AND CONTROL EQUIPMENT

2.3.1 Gas-Fired Power Burner

Modulating design with 15:1 turn down ratio at constant fuel gas mixture ratio; gas-fired, automatic recycling, Interrupted pilot type ignition system. Pilot shall be electrode-ignited natural gas type. The combustion control system shall be the metering type. Design burner and combustion-control equipment for firing natural gas having a specific gravity of 0.6 and a heating value of approximately 1000 BTU per cubic foot and be an integral part of the boiler. Burner controls and safety equipment shall conform to the applicable

2.4 BOILER, TRIM AND CONTROL EQUIPMENT

Provide in accordance with ASME SECTION VII and Controls meeting CSD-1 control trim. Boiler trim shall comply with ASME BPVC SEC IV and additional appurtenances specified below. Non-recycling control interlocks shall have the reset located on control interlock.

2.4.1 Emergency Disconnect Switch

Provide and locate on wall outside boiler room entrance or just inside door, when boiler room door is on the building exterior to allow rapid and complete shutdown of the boiler in the event of an emergency. Emergency switch shall be a 10-amp. fuse-type safety switch. Switch shall be red and furnished with a label indicating function of switch.

2.4.2 Relief Valves

Provide relieving capacity for the full output of boiler installed. Relief-valve piping shall conform to ASTM A 53, schedule 40 steel pipe and be piped full size 6 inches above floor drain.

2.4.3 Pressure Gage/Transducer Readouts

Provide with a scale equivalent to 1.5 time outlet water pressure with 6 inch diameter or be integral with boiler digital control panel . Locate one on supply water piping and one on the return water piping.

2.4.4 Thermometers/Temperature Sensors

Supply and return water sensors to be integral with the boiler control panel to provide readout and to control burner to maintain setpoint.

2.4.5 Drain Tapping

Provide drain valve and piping to a floor drain.

2.4.6 Make-up Water Station

2.4.6.1 Pressure Reducing Station

Provide a water pressure-reducing valve and relief valve, or a combination of the two in the makeup water line to the boiler to maintain a water pressure of 30 psig in the hot water system. Provide a 3/4 inch ball valve by-pass around this valve.

2.4.6.2 Backflow Preventers

Provide reduced pressure type backflow preventer as specified in Section 15400, "Plumbing Systems." Locate upstream of by-pass.

2.4.7 Stack Thermometer

Provide flue gas-dial type thermometer with scale calibrated from 100 to 400 degrees F and mount in flue gas outlet.

2.4.8 Feed water Treatment System

Provide shot-type feeder, manual, intermittent feed, Pot Feeder for use with pressure up to 125 psig maximum.

2.4.9 Combustion Regulator

Provide high limit control integral with the boiler control panel to shut of burner if control system fails and supply water temperature reaches 20 degrees Fahrenheit above control set point and send signal to BAS.

2.4.10 Low Water Level Cutoff Switch/Relay

Provide probe or float actuated type: Low water level cutoff shall cause a safety shutdown by closing fuel valves, shutting down burner equipment, activating a red indicating light, and sending an alarm to the BAS in the event that water level drops below the lowest safe permissible water level established by the boiler manufacturer and ASME BPVC SEC IV. When water level is restored, re-cycle controls to original set points and operating conditions.

2.4.11 Low Water Flow Interlock

Boiler controls shall include low or no flow switch and prevent burner from firing until flow is established.

2.4.12 Boiler Safety Control Circuits

Boiler DDC control panel shall include all of the safety interlocks as required by ASME BPVC SEC IV and FM CSD-1 control sequence.

2.4.13 Indicating Readouts

Provide indicating readouts as follows. Each safety interlock requiring a manual reset shall annunciate each alarm by fault indicated. Non manual reset controls shall be stored in boiler memory and be available for review by operator.

2.4.14 Stack, and Supports

Provide boiler stack constructed of AL 29-4C Stainless steel interior liner and 430 Stainless steel outer jacket. Joints to be ring and taper type water proof joints for condensing vent applications. Joints shall also be sealed with manufacturers approved sealant to provide a vent rated for 3” WG negative pressure and neutral positive pressure. Vent shall be complete with roof thimble, vent flashing and vent cap with bird screen designed to limit back drafts to boiler. Provide vent with fittings to connect to boiler and be equipped with drain if drain is not integral with boiler vent outlet. Stack diameter and height shall be in accordance with manufacturer's recommendation and conform to NFPA 211.

PART 3 - EXECUTION

3.1 EQUIPMENT INSTALLATION

Install equipment in accordance with the manufacturer's installation instructions. Grout equipment mounted on concrete foundations before installing piping. Install piping in such a manner as not to place a strain on equipment. Do not bolt flanged joints tight unless they match. Grade, anchor, guide, and support

pipng without low pockets. Feed water treatment feeders shall be mounted so that the top of the feeder is not higher than. 48 inches above the finished floor.

3.2 EQUIPMENT FOUNDATIONS

Locate equipment foundations as indicated, designed, and made of sufficient size and weight to preclude shifting of equipment under operating conditions or under any abnormal conditions that could be imposed upon the equipment. Foundations shall meet requirements of the equipment manufacturer. Concrete and grout shall conform to Section 03300, "Cast-In-Place Concrete."

3.3 MANUFACTURER'S FIELD SERVICES

Furnish the services of an engineer or technician approved by the boiler manufacture for installation inspection, startup, and tests of equipment as specified below. After installation of equipment the engineer or technician shall provide a signed certificate or certified written statement that the equipment is installed in accordance with the manufacturer's recommendations. Services of more than one engineer or technician may be required based on types of specific equipment. One engineer or technician as appointed by the Contractor shall supervise and be responsible for the overall installation, start-up, test, and check out of systems. This person shall remain on the job until each unit has been in successful operation for 3 days and accepted.

3.4 BOILER CLEANING

Before being placed in service, boiler shall be boiled out for a period of 24 hours at a pressure not exceeding 12 psig. Solution to be used in the boiler for the boiling out process shall consist of two pounds of tri-sodium phosphate per 100 gallons of water. Upon completion of boiling out, flush out boiler with potable water, drain, and charge complete heating system with 50% soft water and 50% RO chemically treated water. Protect boiler and appurtenances against internal corrosion until testing is completed and boiler is accepted. Professional services are required for cleaning/treatment process.

3.5 FIELD QUALITY CONTROL

Perform and furnish everything required for inspections and tests as specified herein to demonstrate that boiler and auxiliary equipment, as installed, are in compliance with contract requirements. Start up and operate the system. During this time, clean strainers until no further accumulation of foreign material occurs. Exercise care to minimum loss of water occurs when strainers are cleaned. Adjust safety and automatic control instruments as necessary to place them in proper operation and sequence. During startup and during tests, factory-trained engineers or technicians employed by individual suppliers of such components as the burner, flame safeguard and combustion controls, and other auxiliary equipment shall be present as required, to insure proper functioning, adjustment, and testing of individual components and systems. Test instrumentation shall be calibrated and have full scale reading from 1.5 to 2 times test values.

3.5.1 Operational Tests

Operate each boiler and appurtenances prior to final testing and insure that necessary adjustments have been made. Provide testing equipment required to perform tests. During this testing period, provide operating instructions and training to persons tasked with operation of the boiler. Tests shall be accomplished with fuel designated include the following:

3.5.1.1 Preliminary Operational Test

Operate boilers continuously for a period of at least 8 hours to demonstrate proper operability of the combustion control, flame safeguard control, and safety interlocks.

END OF SECTION